CLAIMS

1. A microactuator comprising:

a base;

a movable section capable of displacement relative to the base;

an elastic supporting member for supporting the movable section so as to allow the movable section to make a displacement relative to the base along a vertical direction and a tilt relative to the base; and

a plurality of driving sections for causing the movable section to be displaced relative to the base,

wherein,

the plurality of driving sections include a first driving section and a second driving section, and

the elastic supporting member supports the movable section at a position intermediate between a first point of application of a first driving force which is exerted by the first driving section on the movable section and a second point of application of a second driving force which is

exerted by the second driving section on the movable section, and assuming that:

a spring modulus of a restoring force occurring in the elastic supporting member responsive to a displacement of the movable section relative to the base along the vertical direction is kz(N/m);

a spring modulus of a restoration torque occurring in the elastic supporting member responsive to a tilt angle of the movable section relative to the base is kr(Nm/rad); and

a distance between the first point of application and the second point of application is 2L(m),

kz, kr, and L satisfy the relationship of:

$$0.5 \leqq L^2 \cdot kz/kr \leqq 2.$$

2. A microactuator comprising:

a base;

a movable section capable of displacement relative to the base;

an elastic supporting member for supporting the movable section so as to allow the movable section to make a

displacement relative to the base along a vertical direction and a bi-axial tilt relative to the base; and

a plurality of driving sections for causing the movable section to be displaced relative to the base,

wherein,

the elastic supporting member supports the movable section at a position surrounded by a plurality of points of application at which driving forces exerted by the plurality of driving sections on the movable section are applied, and assuming that:

a spring modulus of a restoring force occurring in the elastic supporting member responsive to a displacement of the movable section relative to the base along the vertical direction is kz(N/m);

spring moduli of restoration torques occurring in the elastic supporting member responsive to a tilt angle of the bi-axial tilt of the movable section are krx(Nm/rad) and kry(Nm/rad); and

a distance between each of the plurality of points of application and the position at which the elastic supporting

member supports the movable section is R(m),

kz, krx, kry, and R satisfy the relationships of:

$1 \leqq R^2 \cdot kz/krx \leqq 5$;

$1 \leqq R^2 \cdot kz/kry \leqq 5$; and

$0.67 \leqq krx/kry \leqq 1.5$.

3. The microactuator of claim 1 or 2, wherein the elastic supporting member supports a generally central portion of the movable section.

4. The microactuator of claim 1 or 2, wherein, at least a portion of the movable section is electrically conductive;

each of the plurality of driving sections includes an electrode opposing the movable section; and

each of the plurality of driving sections drives the movable section with an electrostatic force occurring between the movable section and the electrode.

5. The microactuator of claim 1 or 2, wherein the plurality of driving sections are disposed so as to be

generally symmetric around an axis which extends through the position at which the elastic supporting member supports the movable section and which is perpendicular to the base.

6. The microactuator of claim 2, wherein the elastic supporting member comprises a first end portion connected to the base and a second end portion connected to the movable section, and

assuming that a distance between the first end portion and the second end portion is H,

H and R satisfy the relationship of:

$0.8 \leqq H/R \leqq 1.6$.

7. The microactuator of claim 6, wherein a distance between the first end portion and a central portion of the movable section is longer than a distance between the second end portion and the central portion of the movable section.

8. The microactuator of claim 1 or 2, wherein,

the elastic supporting member comprises a beam, and

the beam includes a turn-back portion at which a direction in which the beam extends is reversed.

9. The microactuator of claim 8, wherein the distance between the turn-back portion and the central portion of the movable section is longer than the distance between a position at which the elastic supporting member is connected to the base and a central portion of the movable section.

10. The microactuator of claim 1 or 2, wherein, when one of the plurality of driving sections drives the movable section so that one end of the movable section is displaced in a direction of approaching the base, another end of the movable section is displaced in a direction of becoming more distant from the base.

11. The microactuator of claim 1, wherein kz, kr, and L satisfy the relationship of:

$1 \leqq L^2 \cdot kz/kr.$

12. The microactuator of claim 2, wherein kz, krx, kry, and R satisfy the relationships of:

$2 \leqq R^2 \cdot kz/krx$; and

$2 \leqq R^2 \cdot kz/kry$.

13. An apparatus comprising a plurality of microactuators of claim 1 or 2, wherein

the plurality of microactuators share the base with one another.

14. An apparatus comprising a plurality of microactuators of claim 2, wherein,

the plurality of microactuators share the base with one another, and

assuming that a pitch between adjoining microactuators among the plurality of microactuators is P(m),

P and R satisfy the relationship of:

$0.29 \leqq R/P \leqq 0.37$.

15. The apparatus of claim 13, further comprising a

control section for outputting a control signal to the plurality of driving sections to control the displacement of the movable section.

16. The apparatus of claim 15, wherein the control section is capable of causing the movable section to be displaced in three or more steps.

17. The apparatus of claim 15, wherein the control section outputs the control signal being in accordance with a target displacement amount for a point of application of a driving force exerted on the movable section by the driving section among the plurality of driving sections that receives the control signal.

18. The apparatus of claim 13, wherein the movable section further comprises a light reflecting surface.

19. The apparatus of claim 13, further comprising a light source for generating light.

20. The apparatus of claim 18, further comprising a wave front information generation section for receiving light which has passed at the light reflecting surface and generating wave front information representing a wave front state of the light, wherein

the control section causes the movable section to be displaced in accordance with the wave front information.